CLAIMS

1. A recording method for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the recording method comprising the steps of:

(a) receiving a write instruction which specifies at least a logical sector in which data is to be written;

(b) determining whether the logical sector specified by the write instruction corresponds to a recorded physical sector or an unrecorded physical sector;

(c) when it is determined that the logical sector specified by the write instruction corresponds to an unrecorded physical sector,

(c1) writing the data into the unrecorded physical sector,

(c2) determining whether a verification of the data which has been written into a physical sector is successful,

(c3) when it is determined that the verification of the data that has been written is not successful,

(c31) writing the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(c32) generating a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the write instruction to a remapping address of the selected physical sector, and

(c33) writing the remapping table on the write-once disc; and

(d) when it is determined that the logical sector specified by the write instruction corresponds to a recorded physical sector,

(d1) writing the data into an unrecorded physical sector other than the recorded physical sector, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(d2) determining whether a verification of the data which has been written into a physical sector is successful,

(d3) when it is determined that the verification of the data that has been written is not successful,

(d31) writing the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(d32) generating a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the write instruction to a remapping address of the selected physical sector, and

(d33) writing the remapping table on the write-once disc.

2. A recording method according to claim 1, wherein:

the data is written sequentially in a track assigned on the write-once disc, the track having a plurality of physical sectors, and

the selected unrecorded physical sector is a physical sector designated by a next writable address within a track.

3. A recording method according to claim 2, further comprising the steps of:

receiving a query for the next writable address within a track; and

providing information indicating the next writable address within a track in response to the query.

4. A recording method according to claim 1, wherein:

the remapping table is included in at least a part of a defect list which describes at least one defective physical sector.

5. A recording method according to claim 4, wherein:

the defect list is written into an unrecorded physical sector corresponding to a logical sector in the volume space.

6. A recording method according to claim 1, further comprising the step of allocating at least one of a border-in area and a border-out area in the volume space, and

wherein the defect list is written into the at least one of the border-in area and the border-out area allocated in the volume space.

7. A recording apparatus for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the recording apparatus comprising:

a drive mechanism for performing a recording operation for the write-once disc; and

a drive control section for controlling the drive mechanism;

wherein:

the drive control section is operable to:

(a) receive a write instruction which specifies at least a logical sector in which data is to be written; and

(b) determine whether the logical sector specified by the write instruction corresponds to a recorded physical sector or an unrecorded physical sector;

(c) when it is determined that the logical sector specified by the write instruction corresponds to an unrecorded physical sector, the drive control section controls the drive mechanism to:

(c1) write the data into the unrecorded physical sector, and

(c2) determine whether a verification of the data which has been written into a physical sector is successful,

(c3) when it is determined that the verification of the data that has been written is not successful, the drive control section controls the drive mechanism to:

(c31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(c32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the write instruction to a remapping address of the selected physical sector, and

(c33) write the remapping table on the write-once disc; and

(d) when it is determined that the logical sector specified by the write instruction corresponds to a recorded physical sector, the drive control section controls the drive mechanism to:

(d1) write the data into an unrecorded physical sector other than the recorded physical sector, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space, and

(d2) determine whether a verification of the data which has been written into a physical sector is successful,

(d3) when it is determined that the verification of the data that has been written is not successful, the drive control section controls the drive mechanism to:

(d31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(d32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the write instruction to a

remapping address of the selected physical sector, and

(d33) write the remapping table on the write-once disc.

8. A semiconductor integrated circuit for use in a recording apparatus for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the semiconductor integrated circuit is configured to control a drive mechanism for performing a recording operation for the write-once disc, the semiconductor integrated circuit is operable to:

(a) receive a write instruction which specifies at least a logical sector in which data is to be written; and

(b) determines whether the logical sector specified by the write instruction corresponds to a recorded physical sector or an unrecorded physical sector;

(c) when it is determined that the logical sector specified by the write instruction corresponds to an unrecorded physical sector, the semiconductor integrated circuit controls the drive mechanism to:

(c1) write the data into the unrecorded physical sector,

(c2) determine whether a verification of the data which has been written into a physical sector is successful,

(c3) when it is determined that the verification of the data that has been written is not successful, the semiconductor integrated circuit controls the drive mechanism to:

(c31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(c32) generate a remapping table including remapping information which remaps an original address of the physical sector

corresponding to the logical sector specified by the write instruction to a remapping address of the selected physical sector, and

(c33) write the remapping table on the write-once disc; and

(d) when it is determined that the logical sector specified by the write instruction corresponds to a recorded physical sector, the semiconductor integrated circuit controls the drive mechanism to:

(d1) write the data into an unrecorded physical sector other than the recorded physical sector, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space, and

(d2) determine whether a verification of the data which has been written into a physical sector is successful,

(d3) when it is determined that the verification of the data that has been written is not successful, the semiconductor integrated circuit controls the drive mechanism to,

(d31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(d32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the write instruction to a remapping address of the selected physical sector, and

(d33) write the remapping table on the write-once disc.

9. A recording method for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the recording method comprising the steps of:

(a) in response to a first write instruction which specifies at least a

logical sector in which data is to be written,

(a1) writing the data into the physical sector corresponding to the logical sector specified by the first write instruction,

(a2) determining whether a verification of the data which has been written into a physical sector is successful,

(a3) when it is determined that the verification of the data that has been written is not successful,

(a31) writing the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(a32) generating a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the first write instruction to a remapping address of the selected physical sector, and

(a33) writing the remapping table on the write-once disc; and

(b) in response to a second write instruction which specifies at least a logical sector in which data is to be written,

(b1) writing the data into an unrecorded physical sector other than the physical sector corresponding to the logical sector specified by the second write instruction, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(b2) determining whether a verification of the data which has been written into a physical sector is successful,

(b3) when it is determined that the verification of the data that has been written is not successful,

(b31) writing the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors

in the volume space,

(b32) generating a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the second write instruction to a remapping address of the selected physical sector, and

(b33) writing the remapping table on the write-once disc.

10. A recording apparatus for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the recording apparatus comprising:

a drive mechanism for performing a recording operation for the write-once disc; and

a drive control section for controlling the drive mechanism;

wherein:

the drive control section is operable to:

(a) in response to a first write instruction which specifies at least a logical sector in which data is to be written, the drive control section controls the drive mechanism to:

(a1) write the data into the physical sector corresponding to the logical sector specified by the first write instruction, and

(a2) determine whether a verification of the data which has been written into a physical sector is successful,

(a3) when it is determined that the verification of the data that has been written is not successful, the drive control section controls the drive mechanism to:

(a31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(a32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the first write instruction to a remapping address of the selected physical sector, and

(a33) write the remapping table on the write-once disc; and

(b) in response to a second write instruction which specifies at least a logical sector in which data is to be written, the drive control section controls the drive mechanism to:

(b1) write the data into an unrecorded physical sector other than the physical sector corresponding to the logical sector specified by the second write instruction, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space, and

(b2) determine whether a verification of the data which has been written into a physical sector is successful,

(b3) when it is determined that the verification of the data has been written is not successful, the drive control section controls the drive mechanism to:

(b31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(b32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the second write instruction to a remapping address of the selected physical sector, and

(b33) write the remapping table on the write-once disc.

11. A semiconductor integrated circuit for use in a recording apparatus for writing data on a write-once disc,

the write-once disc having a plurality of physical sectors, the write-once disc including a volume space having a plurality of logical

sectors, each of the plurality of logical sectors corresponding to one of the plurality of physical sectors,

the semiconductor integrated circuit is configured to control a drive mechanism for performing a recording operation for the write-once disc, the semiconductor integrated circuit is operable to:

(a) in response to a first write instruction which specifies at least a logical sector in which data is to be written, the semiconductor integrated circuit controls the drive mechanism to:

(a1) write the data into the physical sector corresponding to the logical sector specified by the first write instruction, and

(a2) determine whether a verification of the data which has been written into a physical sector is successful,

(a3) when it is determined that the verification of the data has been written is not successful, the semiconductor integrated circuit controls the drive mechanism to:

(a31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(a32) generating a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the first write instruction to a remapping address of the selected physical sector, and

(a33) writing the remapping table on the write-once disc; and

(b) in response to a second write instruction which specifies at least a logical sector in which data is to be written, the semiconductor integrated circuit controls the drive mechanism to:

(b1) write the data into an unrecorded physical sector other than the physical sector corresponding to the logical sector specified by the second write instruction, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of

logical sectors in the volume space, and

(b2) determine whether a verification of the data which has been written into a physical sector is successful,

(b3) when it is determined that the verification of the data has been written is not successful, the semiconductor integrated circuit controls the drive mechanism to:

(b31) write the data into an unrecorded physical sector other than the physical sector in which the verification of the written data is not successful, the unrecorded physical sector being selected from the plurality of physical sectors corresponding to the plurality of logical sectors in the volume space,

(b32) generate a remapping table including remapping information which remaps an original address of the physical sector corresponding to the logical sector specified by the second write instruction to a remapping address of the selected physical sector, and

(b33) write the remapping table on the write-once disc.